

Indiana Michigan
Power Company
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June 7, 2004

AEP:NRC:2573-20
10 CFR 50.73

Docket No. 50-316

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Mail Stop O-P1-17
Washington, DC 20555-0001

Donald C. Cook Nuclear Plant Unit 2
LICENSEE EVENT REPORT 316/2004-002-00, UNPLANNED AUTOMATIC
REACTOR PROTECTION SYSTEM ACTUATION DUE TO FEEDWATER
TRANSIENT DURING A POWER REDUCTION

In accordance with 10 CFR 50.73, "Licensee Event Report System," the following report is submitted:

Licensee Event Report (LER) 316/2004-002-00: "Unplanned Automatic Reactor Protection System Actuation Due to Feedwater Transient During a Power Reduction."

Attachment 1 identifies the commitment contained in this submittal.

Should you have any questions regarding this correspondence, please contact Mr. Toby K. Woods, Compliance Supervisor, at (269) 466-2798.

Sincerely,

A handwritten signature in black ink, appearing to read 'Jensen', with a large circular flourish underneath.

Joseph N. Jensen
Site Vice President

HLE/jen

Attachments

IE22

c: J. L. Caldwell – NRC Region III
K. D. Curry – AEP Ft. Wayne
J. T. King – MPSC
J. G. Lamb – NRC Washington DC
MDEQ – WHMD/HWRPS
NRC Resident Inspector
Records Center - INPO

ATTACHMENT 1 TO AEP:NRC:2573-20

REGULATORY COMMITMENTS

The following table identifies those actions committed to by Indiana Michigan Power Company (I&M) in this document. Any other actions discussed in this submittal represent intended or planned actions by I&M. They are described to the Nuclear Regulatory Commission (NRC) for the NRC's information and are not regulatory commitments.

Commitment	Date
Revise the procedure for "Conduct of Operations: Standards" to include that a control room announcement is made notifying all team members when a controller is being operated in manual. (CR 04100009-011)	July 7, 2004

NRC Form 366 (7-2001) U.S. NUCLEAR REGULATORY COMMISSION <div style="text-align: center;">LICENSEE EVENT REPORT (LER)</div> <p style="text-align: center;">(See reverse for required number of digits/characters for each block)</p>				APPROVED BY OMB NO. 3150-0104 EXPIRES 7-31-2004 <small>Estimated burden per response to comply with this mandatory information collection request: 50 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records Management Branch (T-6 E6), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by Internet e-mail to bjs1@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202 (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.</small>								
1. FACILITY NAME <div style="text-align: center;">Donald C. Cook Nuclear Plant Unit 2</div>				2. DOCKET NUMBER <div style="text-align: center;">05000-316</div>			3. PAGE <div style="text-align: center;">1 of 5</div>					
4. TITLE <div style="text-align: center;">Unplanned Automatic Reactor Protection System Actuation Due to Feedwater Transient During a Power Reduction</div>												
5. EVENT DATE			6. LER NUMBER				7. REPORT DATE			8. OTHER FACILITIES INVOLVED		
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER		MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER	
04	08	2004	2004	-- 002 --	00		06	07	2004	FACILITY NAME	DOCKET NUMBER	
9. OPERATING MODE			1		11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply)							
10. POWER LEVEL			48%		20.2201(b)		20.2203(a)(3)(ii)		50.73(a)(2)(ii)(B)		50.73(a)(2)(ix)(A)	
					20.2201(d)		20.2203(a)(4)		50.73(a)(2)(iii)		50.73(a)(2)(x)	
					20.2203(a)(1)		50.36(c)(1)(i)(A)		X 50.73(a)(2)(iv)(A)		73.71(a)(4)	
					20.2203(a)(2)(i)		50.36(c)(1)(ii)(A)		50.73(a)(2)(v)(A)		73.71(a)(5)	
					20.2203(a)(2)(ii)		50.36(c)(2)		50.73(a)(2)(v)(B)		OTHER Specify in Abstract below or in NRC Form 366A	
					20.2203(a)(2)(iii)		50.46(a)(3)(ii)		50.73(a)(2)(v)(C)			
					20.2203(a)(2)(iv)		50.73(a)(2)(i)(A)		50.73(a)(2)(v)(D)			
					20.2203(a)(2)(v)		50.73(a)(2)(i)(B)		50.73(a)(2)(vii)			
					20.2203(a)(2)(vi)		50.73(a)(2)(i)(C)		50.73(a)(2)(viii)(A)			
					20.2203(a)(3)(i)		50.73(a)(2)(ii)(A)		50.73(a)(2)(viii)(B)			
12. LICENSEE CONTACT FOR THIS LER												
NAME <div style="text-align: center;">Toby Woods, Regulatory Affairs</div>								TELEPHONE NUMBER (Include Area Code) <div style="text-align: center;">(269) 466-2798</div>				
13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT												
CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX			
14. SUPPLEMENTAL REPORT EXPECTED								15. EXPECTED SUBMISSION DATE		MONTH	DAY	YEAR
YES (If Yes, complete EXPECTED SUBMISSION DATE).				X	NO							
16. Abstract (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) On April 8, 2004 at approximately 2215 Eastern Standard Time, Unit 2 reactor experienced an unplanned automatic reactor protection system (RPS) actuation, resulting in a plant trip from 48 percent power. Prior to the trip, Unit 2 was in the process of lowering power from 82 percent to 8 percent power level. The operating main feedwater pump was being controlled manually via the differential pressure (DP) controller. Failure to manually control DP within the prescribed values, caused all four feedwater regulating valves (FRVs) to begin modulating excessively. All four FRVs were placed in manual control to mitigate the feedwater flow oscillations. However, rising water level in number 24 Steam Generator reached the high level trip setpoint causing an automatic turbine trip which caused the automatic RPS actuation. Plant equipment responded as expected, including the start of the auxiliary feedwater system, except the main generator output breakers failing to open and a condensate leak developing in the main turbine condenser hotwell area. The main generator output breakers were manually opened in accordance with the reactor trip response procedure and the condensate leak was stopped by securing pumps in accordance with plant procedures. The root causes of the event were determined to be inadequate manual main feedwater DP control and inadequate communications between the control room operators and other shift personnel. Corrective actions include redefining and reinforcing standards for the conduct of operations and personnel action taken in accordance with appropriate performance management policies for the control room personnel involved. This event was reported in accordance with 10 CFR 50.72 (b)(2)(iv)(B) and 10 CFR 50.72 (b)(3)(iv)(A).												

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17. TEXT (If more space is required, use additional copies of NRC Form (366A))

Conditions Prior to Event

Unit 1 = 100% Power

Unit 2 ~ 48% Power

Description of Event

At approximately 1930 on April 8, 2004, a planned power reduction commenced from approximately 82 percent power to address Main Turbine Control Fluid system [TG] equipment issues.

Power reduction had progressed to approximately 50 percent and the East Main Feedwater pump (EMFP) [P] was being removed from service per plant procedure. The procedure directed that the turbine speed controller [SC] (2-RU-3) for the EMFP be operated in manual to lower the speed of the main feedwater pump being removed from service. Concurrently, the feedwater differential pressure (DP) control [PDC] (2-RU-5) was operated in manual to maintain DP within a procedurally specified band, of plus 20 psid to minus 10 psid of program, by controlling the West Main Feedwater pump's speed.

During the removal from service of the EMFP, the main feedwater DP was not manually controlled by the licensed operator within the specified DP band. All four feedwater regulating valves (FRVs) [FCV] were observed to be modulating excessively between the nearly full open or full open position and the nearly full closed position. The FRV modulation was attempted to be controlled by placing the FRVs in manual control per the direction of the Unit Supervisor (Senior Reactor Operator). When the number 24 Steam Generator (S/G) [SG] FRV was taken to manual, feedwater flow being provided by the FRV exceeded the steam flow from the associated number 24 S/G. This condition was not rectified in time causing the water level in number 24 S/G to rise to the turbine trip setpoint, resulting in a turbine [TRB] trip and subsequent automatic RPS [JG] actuation at 2215.

Following the automatic RPS actuation, all plant systems responded as expected, including the automatic start of the auxiliary feedwater system [BA], except the main generator output breakers [BRK] failed to open and a condensate [SD] leak developed in the Low Pressure Turbine "C" Condenser [COND] hotwell area. The secondary plant equipment problems did not significantly complicate the plant response or the ability of the operators to respond to the event. The main generator output breakers failed to open due to one of the main turbine stop valve limit switches [ZIS] failing to indicate the closed position. The main generator output breakers were manually opened in accordance with the reactor trip response procedure. The Low Pressure Turbine "C" Condenser hotwell area experienced a leak in the south side of the Low Pressure Turbine "C" Condenser at the condensate booster pump emergency leakoff line penetration into the main condenser. The condensate leak was stopped by securing hotwell and condensate pumps [P] in accordance with plant procedures. During the post-event walkdown of the piping, a pipe support [SPT] with pre-existing damage was identified and repaired along with the leak in the condenser.

At 0147 on April 9, 2004, Indiana Michigan Power Company (I&M) made a four-hour notification (EN # 40660) to the NRC Operations Center, in accordance with 10 CFR 50.72(b)(2)(iv)(B) to report the actuation of the reactor protection system. In conjunction with this notification an eight-hour notification was made in accordance with 10 CFR 50.72(b)(3)(iv)(A) to report the valid automatic actuation of the auxiliary feedwater system. This License Event Report is being submitted in accordance with 10 CFR 50.73 (a)(2)(iv)(A).

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Cause of Event

The cause of the Unit 2 automatic RPS actuation was inadequate manual control of feedwater to the steam generators and inadequate communications within the control room stemming from incorrect assumptions, operator overconfidence, and an inadequate brief.

Analysis of Event

An assessment of this event was performed and it was determined that this event was bounded by the existing accident analysis associated with unplanned reactor trips (i.e., transient) with the main condenser (i.e., ultimate heat sink) available. The contribution to Core Damage Frequency (CDF) from all transients is very small. Transients contribute less than 1 percent of the total CDF in the current Probabilistic Risk Assessment (PRA) model. The current transient initiating event frequencies include operator errors. The change in risk with respect to core damage and large early release frequency due to high steam generator water level, and subsequent plant trip, have been qualitatively assessed and judged no different than any other unplanned reactor trip with the main condenser available. This assessment is based on the following considerations:

- The automatic plant trip, due to high steam generator water level, functioned properly. Automatic post-trip features functioned as designed with the exception of the main generator output breakers failing to open and the condensate booster pump to condenser recirculation return line penetration leakage. Operators took procedurally directed actions and responded to the transient in an appropriate and timely manner, resulting in a safe and stable plant configuration.

Although the main generator output breakers failed to open, which resulted in the main generator motoring for approximately nine minutes, there was no affect on either the generator [GEN] or any mitigation capability of the plant. The condensate booster pump recirculation return line penetration leakage did not result in a loss of condenser vacuum [SH] (i.e., loss of the ultimate heat sink) nor did it result in loss or degradation of the condensate storage tank [KA] or associated functions. The condenser leak did not result in internal flooding. The D. C. Cook Nuclear Plant PRA internal flooding analysis ascertained that a condenser leak would not result in a risk significant internal flooding scenario. The Condenser Pit Sump annunciator [LA] was received in the Control Room approximately one hour after the plant trip. The operators were able to reduce the leak rate approximately 20 minutes later by isolating condensate booster pumps. Although the initial leak rate exceeded the Condenser Pit Sump pump capacity, the sump pumps were able to pump out the Condenser Pit [WK] once the leak rate was reduced. Even though a majority of the leakage was confined to the Condenser Pit Sump other equipment was sprayed with condensate from the leak. The leakage did not result in degradation of any equipment relied upon for accident mitigation or safe shutdown of the plant.

- The inadvertent cause of the automatic RPS actuation, high steam generator water level, does not contribute to the increased likelihood of any initiators, other than transients that result in or from a reactor trip.
- Neither the high steam generator water level, nor the subsequent unit trip, degraded any system used to mitigate core damage, assure containment integrity, or maintain defense-in-depth and safety margins.

Accordingly, I&M has concluded that there was no impact on the health and safety of the public as a result of this event.

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Corrective Actions**Equipment Corrective Actions Taken:**

- Repaired Low Pressure Turbine "C" Condenser leak and condensate booster pump emergency leakoff line pipe supports. (Work Request 03239043 and 04100002)
- Replaced the failed main turbine stop valve position indicator and associated cabling. Verified proper operation. (Work Request 04100008)

Root Cause Immediate Corrective Actions Taken:

- The feed pump turbine shutdown procedure was revised, effective April 11, 2004, to require that control of the MFP being left in service to assume additional flow demand, remains in automatic. (Condition Report 04100009)
- The procedure, "Conduct of Operations: Standards," was revised, effective April 16, 2004, to require the Reactor Operator to notify the Unit Supervisor when a manually controlled parameter goes outside of the control band, for controllers that are being operated in manual. (Condition Report 04100009)
- Personnel action in accordance with appropriate performance management policies was taken for the control room personnel involved. Furthermore, guidance regarding personnel actions as a result of unacceptable performance have been clarified, formalized, and disseminated to Operations Department personnel. (Condition Report 04100009)
- On May 2, 2004 The Plant Manager briefed all management personnel assigned to perform management oversight in the control room. This brief specifically emphasized communication standards. (Condition Report 04100009)
- Implemented use of the Human Performance Scorecard for the evaluation of individual performance in the course of simulator evaluations. Use of compiled performance scores will be used to track crew performance. (Condition Report 04100009)

Root Cause Corrective Actions to Prevent Recurrence:

- Revise the procedure, "Conduct of Operations: Standards," to include that a control room announcement is made notifying all team members when a controller is being operated in manual. (Condition Report 04100009, Corrective Action 011 – due July 7, 2004)

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Previous Similar Events

A review of LERs issued by Indiana Michigan Power Company from 1999 to the present, for both units, identified one similar occurrence of a reactor trip due to operations personnel error.

- LER 316-2004-001 - Automatic Reactor Trip Due to RPS Actuation, While Manipulating Train A Reactor Trip Bypass Breaker

I&M has reviewed the above docketed LER and has determined that the events associated with the identified LER were similar. The above event occurred on March 29, 2004. Given the close proximity in time to this event, actions to prevent recurrence were not fully implemented at the time of this event. Thus the corrective actions associated with the event could not have prevented this event.